# ON LARVAE, PROBABLY TAUROCERAS, FROM THE NEOTROPICS (COLEOPTERA: TENEBRIONIDAE)

*By* T. J. Spilman[1]

In the collection of the U. S. National Museum, nine large larvae of the beetle family Tenebrionidae bear the identification label, "near *Scotobates* or *Centronopus.*" None are associated with adults, and until adults are bred from larvae like these or at least are found associated with such larvae, positive identification can not be made. However, I have made tentative identification of the preserved larvae by a process of elimination.

Six of the preserved larvae bear Jamaican locality labels, one is from Honduras, and two are from Brazil. Because Jamaica has only 20 known tenebrionid species, I used that island fauna for my eliminations. First of all, the larvae in question are members of the Tenebrionini, as characterized by St. George (1924:3). Only three species of the Tenebrionini are known from Jamaica: *Zophobas atratus* (Fabricius), *Tenebrio molitor* Linnaeus, and *Tauroceras cornutum* (Fabricius). The larvae of the first two species were included in a key and illustrated by St. George (1924:10, 12, Figs. 51, 62). *Zophobas* and *Tenebrio* can be eliminated from consideration because their described morphological characteristics are different from the characteristics of the larvae in question. Thus, all species, except *Tauroceras cornutum,* are eliminated. Secondly, but of less importance, size might be an indicator. Often, though not always, sizes of larvae and adults are in direct proportions, *i.e.,* a large larva develops into a large adult. On Jamaica most tenebrionid species are of small to moderate lengths; in this size group *Tenebrio molitor* is the largest, with a maximum length of 32 mm. in the larval stage and 18 mm. in the adult stage. Only *Zophobas atratus* and *Tauroceras cornutum* could be considered large, having a maximum length of 26 mm. and 32 mm., respectively, in the adult stages. The larva of the former attains a maximum length of 45 mm. The undetermined larvae are very large, 45 to 57 mm. in length. This large size would point to *Tauroceras cornutum,* for *Zophobas atratus* has already been eliminated on morphological characteristics.

Therefore, an identification label reading, "probably *Tauroceras cornutum* (Fabricius)" is being attached to the six Jamaican larvae. A definite identification can be made when larvae are positively associated with adults. The larvae from Honduras and Brazil are congeneric with the Jamaican larvae, but the number of species of *Tauroceras* described from the mainland, four, precludes specific identification. These larvae are identified merely as, "probably *Tauroceras* sp." The nine larvae are described and illustrated below.

The larvae described as "probably *Tauroceras*" would be determined as

---

[1] Entomology Research Division, Agr. Res. Serv., U. S. Dept. of Agr., Washington, D.C.

*Scotobates* (now *Centronopus,* according to Spilman 1962:3) in the key to the larvae of North American Tenebrionini of St. George (1924:11). The following couplet will separate the two genera:

First abdominal spiracle 3 or more times longer than wide; abdominal dorsal sclerites without coarse punctures, with only a few setigerous punctures and slit-like punctures in anterior sinuous sulcus; ninth abdominal sclerite with numerous spines and tubercles in addition to paired urogomphi. . . . . probably *Tauroceras* Hope

First abdominal spiracle less than 2 times longer than wide; abdominal dorsal sclerites with many coarse punctures scattered over surface and with only a few setigerous punctures; ninth abdominal sclerite without spines or tubercles, with punctures and paired urogomphi. . . . . *Centronopus* Solier

The morphological terminology used herein is the same as that used by Wade and Bøving (1921) and St. George (1924) except for areas of the abdominal segments. In *Tauroceras* (Fig. 10) and all other Tenebrionini larvae known to me, abdominal segments 1-8 have a large dorsal sclerotized plate and a smaller ventral plate, with a membranous area connecting the two laterally. A spiracle is located in the anterolateral corner of each dorsal plate just below the longitudinal line. Separate pleural plates are not present. The lateral areas of the dorsal plate and ventral plate are termed the epipleural region and hypopleural region, respectively, by the above-mentioned authors. Use of the terms epipleural and hypopleural leads one to believe that the pleuron is a sclerite that can be delimited.

Snodgrass (1935: 248-251, Fig. 137 A-E) gives the various combinations of abdominal sclerotizations that occur in insects. His Fig. 137 C is comparable to the sclerotization in the Tenebrionini. He says, "The lower limit of the dorsum must be determined by discovering, where possible, the position of the dorso-pleural line . . . , which is often marked by a lateral groove extending into the thorax above the subcoxal pleurites. . . ." This dorsopleural line is easily found in the Tenebrionini; it is the membranous area between the dorsal and ventral plates. The dorsal plate is therefore the tergum. Concerning the lower limits of the pleuron, Snodgrass says, "In the usual condition found in adult and nymphal insects the primitive pleura and sternum of each segment . . . are united in a continuously sclerotized *definitive sternal plate* . . . opposed to the tergum." Thus, the ventral limit of the pleuron, the pleuronventral line, cannot be determined on the abdomen of insects such as the Tenebrionini because the pleura and sternum are united. The area that is usually termed hypopleural region by describers of beetle larvae is probably part of the pleuron that has fused with the sternum! Therefore, I say the terms epipleural and hypopleural are liable to be misinterpreted, even if used to define only general body regions.

I have given definite terms only to the sclerites I am able to delimit. Each of the first eight segments of the abdomen of the Tenebrionini, according to my terminology, have the following basic parts: Dorsal sclerite or tergum, ventral sclerite, dorsoventral connecting membrane. The lateral areas of the dorsal and ventral sclerites are called merely lateral areas, without the confusing reference to pleuron, epipleural region, or hypopleural region.

## Description of Larvae, probably Tauroceras cornutum (F.), from Jamaica

Tenebrionine; elongate, straight, cylindrical; relatively heavily sclerotized, especially ninth abdominal segment; overall color dark yellow, except dark brown on head and anterior sinuous sulci of dorsal sclerites, with dorsal sclerites of abdomen having progressively more surface dark brown proceeding from first to eighth so that most of eighth dorsal sclerite is dark brown, ninth abdominal segment completely dark brown. Total length, 25 to 45 mm.

*Cranium* (Fig. 1) rounded, exerted, broader than long. Epicranial halves meeting posteriorly, at point of contact very short and without sulcus; each half with dense, long, erect setae anterolaterally and anteroventrally, with dense, small punctures dorsoposteriorly. Gula distinct, coriaceous, parallel-sided. Frons composed of two parts, separated by an unpigmented area medially and short sulci laterally; the anterior or epistomal part short, very broad, with dense, erect setae; posterior part vaguely triangular, with lateral borders obtusely angulate at half length, without setae; posteriorly almost attaining occiput. Clypeus strongly transverse, lateral borders covering anteriorly; with dense, confused, erect setae. Eyes indistinct, with whitish hemispherical area just posterior to antennal socket having vague indications of three ocelli. Antenna (Fig. 7) of moderate size; first segment simple, with short setae distally, second segment slightly longer than first, gradually expanded from base to half length, then asymmetrically rounded distally, apical area smooth but showing a darker reticulate pattern on the lighter surface, with minute setae apically; third segment very small, easily overlooked, with 2 minute setae.

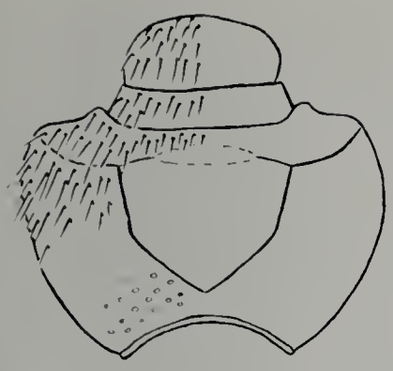
*Labrum* in situ subhemispherical in dorsal view. Aboral surface (Fig. 1) with many confused setae of moderate length, though the posterior setae much longer than others. Adoral surface (Fig. 2) with 3 pairs of long, coarse, depressed, medially directed setae on anterior border; lateral areas pigmented, with confused, short, appressed setae; with large oval central area lightly pigmented, this area ringed with dark, short pile on all but posterior border; posterior border with sharp, asymmetrical, coarse carinae; central area with very short, stout, medially directed seta on lateral border and with a few, usually 3, small sensory organs just medial to each seta; base of adoral surface with pair of thickened sclerotized elongate plates forming a shallow trough, this trough with approximately 8 small sensory organs. *Mandibles* (Figs. 3 and 4) stout, with acute, trifid apex, moderately asymmetrical; dorsal apical tooth on left mandible more basal and blunt than on right mandible; all other teeth on both mandibles acute; middle tooth longest; without tooth in space between 3 apical teeth and molar area; lateral dorsal border of each mandible moderately angulate, in cross section, not sharp, not explanate, with long, dense, undifferentiated setae; lateral area without membranous elevation. *Maxilla* of moderate length. Aboral surface (Fig. 5) having mala and stypes fused, with confused short to very long setae, narrowed basally but truncate at extreme base; cardo large, with a large hemispherical posterior part and a smaller subtriangular anterior part; articulating area large, approximately semicircular. Adoral surfaces (Fig. 6) having mala sclerotized, stout, apically subtruncate, medial surface with border of stout, short setae apically and longer coarse setae basally; otherwise with confused

→

Figures 1-12. Larva, probably *Tauroceras cornutum* (F.) 1—Cranium, with labrum attached, dorsal view. 2—Labrum, adoral view. 3—Left mandible, dorsal view. 4—Right mandible, dorsal view. 5—Right maxilla and labium, aboral view. 6—Left maxilla and labium, adoral view. 7—Left antenna, dorsal view. 8—Left prothoracic leg, posterior view. 9—Left mesothoracic leg, posterior view. 10—1st abdominal segment, posterolateral view. 11—Tubercle of 9th abdominal dorsal sclerite, posterior view. 12—9th abdominal dorsal sclerite, dorsal view.

Figure 13. Larva, probably *Tauroceras* sp. A. 9th abdominal dorsal sclerite, dorsal view.

Figure 14. Larva, probably *Tauroceras* sp. B. 9th abdominal dorsal sclerite, dorsal view.



1

2

3 4

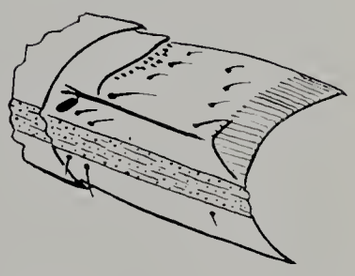
5

6

7

8

9



10

11

12

13

14

setae, those at apex being long; remainder of surface membranous except near lateral borders, with separation of sclerites obscure except near lateral borders. Palpus extending beyond apex of male. Palpifer small, merely a small sclerotized band. *Labium* of moderate length. Aboral surface (Fig. 5) having mentum comparatively long, approximately as wide anteriorly as posteriorly and with confused, long setae; submentum and gula fused; ligula with short fingerlike projection, of approximately same shape and size as last segment of palpus. Adoral surface (Fig. 6) with very large hypopharyngeal sclerome, body of which is transverse and weakly bisinuate on anterior border from which emanates a long, anteriorly directed, sharply sulcate process; posterior to sclerome is an asymmetrical, strongly sclerotized, raised area. Palpus with short, simple segments.

*Prothorax* long; dorsal sclerite without anterior sulcus; without posterolateral sulcus; with posterior longitudinally striated band; with 3 vague transverse rows of a few, very long, slender setae; laterally without longitudinal line; eusternum with short setae medially. *Mesothorax* shorter, length approximately half length of prothorax; dorsal sclerite with anterior sulcus; without posterolateral sulcus; with posterior longitudinally striated band; laterally with very vague longitudinal line; with very large ovate spiracle; with 2 transverse rows of setae, anterior row with approximately 6 short setae, posterior row with 4 long setae; eusternum with long dense setae anterior to coxae and medially. *Metathorax* longer than mesothorax, length approximately two-thirds length of prothorax; otherwise like mesothorax. *Anterior sulcus* of dorsal sclerites of mesothorax, metathorax, and abdominal segments 1-8 as follows: Weakly sinuous, deep, dark brown, located on anterior border of sclerite; with sharp anterior border and moderately delimited posterior border; with numerous slitlike punctures, each of which is surrounded by a dark brown elliptical area; sulcus short medially and laterally where it contains one row of punctures, but long otherwise where it contains 2 or 3 rows of punctures; laterally sulcus almost joining longitudinal line. *Abdominal segments 1-8* (Fig. 10) with length approximately two-thirds length of prothorax; with anterior sulcus; with distinct longitudinal line; with elliptical spiracle on anterolateral corner of dorsal sclerite, just ventral to longitudinal line, size of spiracle of first segment two-thirds size of mesothoracic spiracle, size of spiracle of segments 2-8 half size of mesothoracic spiracle; with posterior longitudinally striated band; with posterolateral sulcus on lateral portions of longitudinally striated band, curving from anterior border of band to posterolateral corner of band; with 2 transverse rows of setae, anterior row with approximately 5 short setae, posterior row with 4 long setae; ventral sclerites with long seta on each of four corners, first sclerite with dense setae on anterior third, sclerites 2-8 with dense setae on anterolateral corners only. *Abdominal segment 9* (Fig. 12) with a very large dorsal sclerite, forming the apex of the abdomen, having a pair of urogomphi, and with a small ventral sclerite. Urogomphi long, slender, smooth, straight, very sharply acuminate. Dorsal surface of dorsal sclerite with many small tubercles; each tubercle (Fig. 11) with basal struts, a domelike granulate surface, and a very small, stout seta arising posteriorly. Dorsal surface also with a pair of short, curved spines near midline, and with 3 longer spines laterally at base of each urogomphus, middle spine of triad being longest; surface between urogomphi with approximately 8 very short spines. Dorsal sclerite with anterior border and all of ventral surface with dense, long, erect setae. Ventral sclerite forming a flaplike operculum for the segment, with dense, long, erect setae. Posterior body opening containing no papillae, containing only anus.

*Prothoracic leg* (Fig. 8) large. Coxa with confused, bristlelike setae. Trochanter long, with 2 unequal rows of short, very coarse setae along distal half of ventral surface; otherwise covered with long, confused, bristlelike setae. Femur very stout, on ventral border incrassate, with 2 unequal rows of short, very coarse setae; posterior surface near dorsoapical angle with 3 widely spaced, very short, stout setae; otherwise with dense, confused, bristlelike setae. Tibiotarsus with posteroventral surface bordered by very coarse setae; this surface with very few setae. Pretarsus very stout, with 2 small setae ventrally. *Mesothoracic leg* (Fig. 9) smaller, approximately four-fifths size of prothoracic leg. Coxa with confused, bristlelike setae. Trochanter long, with 2 rows of short, very coarse setae along distal half of ventral surface, these rows with fewer setae than on protrochanter, and a few, very short setae on distal area of posterior surface. Femur stout, ventral border

not incrassate, with approximately 6 long, coarse setae; just posterior to this row is 1 very short, coarse seta; posterior surface near dorsoapical angle with 4 short, stout setae. Tibiotarsus with posteroventral surface bordered anteriorly by very coarse setae; this surface with very few setae. Pretarsus very stout, with 2 small setae ventrally. *Metathoracic leg* similar to mesothoracic leg.

*Specimens examined.* JAMAICA: Montego Bay, 1910, E. A. Andrews leg., 2 larvae; rotten log across stream, St. Thomas, February 8, 1937, E. A. Chapin and R. E. Blackwelder leg. (Station No. 392), 2 larvae; in rotten stump, at ford one mile S. E. of Stony Hill, April 29, 1941, E. A. Chapin leg. (Station No. 526), 2 larvae.

*Tauroceras cornutum* has been recorded in the literature from Jamaica and South America, the latter without more definite locality.

## Description of Larvae probably Tauroceras sp. A, from Brazil

Similar to larva, probably *Tauroceras cornutum* (F.), from Jamaica, but differing as follows: Dorsal sclerite of 9th abdominal segment (Fig. 13) having spines more numerous and slightly longer; with 3 curved spines between median pair and lateral triad; with 2 pairs of small spines ventral to median pair but dorsal to spines between urogomphi. Total length, 45 to 55 mm.

*Specimens examined.* BRAZIL: Therezopolis, Organ Mts., Estado de Rio de Janeiro, Paul Sandig leg., 2 larvae.

The following species of *Tauroceras* are recorded from South America: *angulatum* (Perty), from Brazil and Argentina; *aries* Dalman, from Brazil; *cornutum* (F.), from South America; and *nitidum* Pic, from Brazil.

## Description of Larva, probably Tauroceras sp. B, from Honduras

Similar to larva, probably *Tauroceras cornutum* (F.), from Jamaica, but differing as follows: Dorsal sclerite of 9th abdominal segment (Fig. 14) having spines on whole dorsal surface much more numerous and longer, more so than on larva, probably *Tauroceras* sp. A, from Brazil; tubercles smaller than on other larvae and less numerous than spines; many spines with basal struts similar to struts of tubercles; with obvious, short, stout seta arising on posterior surface of each spine. Total length, 57 mm.

*Specimens examined.* HONDURAS: Subizana, Yoro, Staddmann leg., 1 larva.

*Tauroceras angulatum* (Perty) has been recorded from Mexico, British Honduras, Guatemala, Nicaragua, Brazil, and Argentina. It is the only species of the genus recorded from Central America. Perhaps the larva described above could by a process of elimination be identified as *angulatum,* but I prefer to put an indefinite determination label on it because of the possible existence of undescribed species in the large tenebrionid fauna of Central America.

## Literature Cited

St. George, R. A.
1924. Studies on the larvae of North American beetles of the subfamily Tenebrioninae with a description of the larva and pupa of *Merinus laevis* (Olivier). Proc. United States Natl. Mus. 65(1): 1-22, figs. 1-68.

SNODGRASS, R. E.
1935. Principles of insect morphology. New York and London: McGraw-Hill Book Company, Inc.

SPILMAN, T. J.
1962. The new world genus *Centronopus,* with new generic synonymy and a new species (Coleoptera: Tenebrionidae). Trans. American Ent. Soc. 88: 1-19, 8 figs.

WADE, J. S. and BØVING, A. G.
1921. Biology of *Embaphion muricatum.* Jour. Agric. Res. 22(6): 323-334, 3 figs., 2 pls.

# CONFUSED WATER BEETLES (COLEOPTERA: DYTISCIDAE)

On October 18, 1958, I was engaged in that onerous chore of painting storm window frames. The windows were placed horizontally on saw-horses, about 3 feet off the ground, under the open sky, but in the shade of a tall tree. The day was bright and clear with a moderate southeast breeze. The temperature was around 70° F.

About 2 o'clock I began to be annoyed by beetles landing on the glass with a distinct "plink" and skidding into the paint. I absentmindedly lifted the first few out of the sticky paint and tossed them away. Suddenly I realized that most of them were a single species of small predaceous diving beetle.

It is well known that most dytiscids have the hind legs highly modified for swimming, and are "awkward in locomotion on land," according to Balduf (1935, Bionomics of Entomophagous Coleoptera, p. 30). Thus when they hit the glass they would skid into the paint. It would seem that these beetles were mistaking the horizontal window pane for water. Essig (1942, College Entomology, p. 538) notes that dytiscids are "attracted to bright tin roofs and automobiles." Between 2 and 4 P.M. fifteen specimens of *Laccophilus fasciatus* Aubé were collected from the storm window glass. Only two terrestrial beetles landed on the window during this time; one specimen each of *Meibomeus musculus* (Say) (Bruchidae) and *Tritoma humeralis* Fab. (Erotylidae).

The dytiscids were coming in from the southeast with the prevailing breeze. Probably they were migrating, as Balduf (*op. cit.,* p. 31) says they migrate "mostly by day in spring and autumn, and at night in summer." The nearest large body of water is almost 2 miles to the southeast, but there are smaller ponds nearer in other directions.

The use of glass as a method of collecting dytiscids is not being recommended, but the incident seems to show that at least one species may confuse glass with water under certain conditions. Also, it may indicate that these beetles find new water areas by sight and not by the use of some other sense.

Appreciation is expressed to P. J. Spangler for confirming the identification of the dytiscids, and to J. M. Kingsolver for determining the other two beetles.—GARLAND T. RIEGEL, *Dept. of Zoology, Eastern Illinois University, Charleston, Ill.*

A more cautious taxonomist would have talked of similarity rather than relationship. Taxonomists . . . too often say "related" when they should say "similar to." —Darlington, 1957, Zoogeography, p. 27.